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## NEW GENUS AND NEW SPECIES OF THE FAMILY ISSIDAE (HEMIPTERA: AUCHENORRHYNCHA: FULGOROIDEA) FROM SOUTHERN SPAIN

V.M. Gnezdilov<sup>1\*</sup> and C.F.M. den Bieman<sup>2</sup>

<sup>1</sup>Zoological Institute, Russian Academy of Sciences, 1 Universitetskaya Emb., 199034 Saint Petersburg, Russia;  
e-mails: vgnezdilov@zin.ru, vmgnezdilov@mail.ru

<sup>2</sup>Ulvnhout, The Netherlands; e-mail: cdbieman@planet.nl

### ABSTRACT

*Granadus albirhombus* gen. et sp. nov. is described from the Granada Province in Spain. This new genus and new species is characterized by a complex of features distinguishing it from other genera of the subtribe Issina: metope with only median carina; coryphe twice as wide as long medially; fore wings with wide hypocostal plate; forewing veins sequence – R 2 M 3 CuA 1; hind wings rudimentary; hind tibia with 2 lateral spines in its distal half; first metatarsomere with 2 latero-apical spines and 9 intermediate spines in continuous row; phallobase slightly curved (in lateral view), narrow, dorso-lateral lobes fused dorsally; each dorso-lateral lobe of the phallobase with semicircular subapical process; ventral phallobase lobe long and wide, almost as long as dorso-lateral lobes, with 2 longitudinal lobes basally covering aedeagal hooks; aedeagus with pair of short ventral hooks arising in its basal third and directed to its base; hind margin of female sternite VII with large rectangular median process; gonopods rounded; lateral fields of posterior connective laminae of gonapophyses IX lobe-shaped; median field of the laminae in shape of large single lobe; anterior connective lamina of gonapophyse VIII with 3 rounded teeth in apical group and 2 teeth and 3 combs in lateral group.

**Key words:** Iberian Peninsula, Issini, morphology, new genus, new species, systematics

## НОВЫЙ РОД И НОВЫЙ ВИД СЕМЕЙСТВА ISSIDAE (HEMIPTERA: AUCHENORRHYNCHA: FULGOROIDEA) ИЗ ЮЖНОЙ ИСПАНИИ

В.М. Гнездилов<sup>1\*</sup> и К.Ф.М. ден Биман<sup>2</sup>

<sup>1</sup>Зоологический институт Российской академии наук, Университетская наб. 1, 199034 Санкт-Петербург, Россия;  
e-mails: vmgnezdilov@mail.ru, vgnezdilov@zin.ru

<sup>2</sup>Ulvnhout, The Netherlands; e-mail: cdbieman@planet.nl

### РЕЗЮМЕ

*Granadus albirhombus* gen. et sp. nov. описан из провинции Гранада в Испании. Этот новый род и новый вид характеризуется набором признаков, отличающих его от других родов подтрибы Issina: метопа только с медиальным килем; корифа в 2 раза шире длины по средней линии; передние крылья с широкой гипокостальной лопастью; схема жилкования переднего крыла – R 2 M 3 CuA 1; задние крылья рудиментарны; задняя голень с 2 боковыми шипами в дистальной половине; первый метатарзомер с 2 латеро-апикальными и 9 интермедиальными шипами в сплошном ряду; фаллобаза слабо изогнута (вид сбоку), узкая, дорсо-латеральные лопасти слиты дорсально; каждая дорсо-латеральная лопасть фаллобазы с полукруглым субапикальным выростом; вентральная лопасть фаллобазы длинная, широкая, почти такой же длины как дорсо-латеральные

\*Corresponding author / Автор-корреспондент

лопасти, с 2 продольными лопастями базально, прикрывающими крючки эдеагуса; эдеагус с парой коротких вентральных крючков, отходящих в его базальной трети и направленных к его основанию; задний край VII стернита самок с крупным прямоугольным выростом в средней части; гоноплаки округлые; латеральные поля задних соединительных пластинок гонапофизов IX лопастевидные; медиальное поле задних соединительных пластинок в виде одной крупной лопасти; передняя соединительная пластинка гонапофиза VIII с 3 округлыми зубцами в апикальной группе и 2 зубцами и 3 киями в латеральной группе.

**Ключевые слова:** Иберийский полуостров, Issini, морфология, новый род, новый вид, систематика

## INTRODUCTION

During a field trip to Granada by the second author in May 2016 the series of 8 specimens representing a new genus and new species of the subtribe Issina Spinola, 1839 of the tribe Issini Spinola, 1839 was collected. These specimens were collected on herbaceous vegetation along the road (Fig. 1) and in the olive orchards.

The Spanish fauna of the family Issidae is in need of a comprehensive revision, although this region has been in the focus of interest of taxonomists since the middle of the nineteenth century. The first Spanish issid record was contributed by Rambur (1840) who described *Palmallorcus punctulatus* (originally *Issus punctulatus* Rambur, 1840) from Andalusia. Thirty years later Fieber (1877) added 3 more new species – *Tingissus melanophleps* from Huesca Province,



**Fig. 1.** Type locality: 6 km north of Castillo de Baños, Granada province (photo by C.F.M. den Bieman).

*Fieberium impressum* from Madrid, and *Bergevinium angulare* from Malaga (Gnezdilov et al. 2011) and recorded *Palaeolithium distinguendum* (Kirschbaum, 1868) from Spain (Fieber 1872) (all mentioned species were originally described in the genus *Hysteropterum*). Bolivar and Chicote (1879) recorded *Mulsantereum maculifrons* (Mulsant et Rey, 1855) (originally *Hysteropterum maculifrons*) from Catalonia ("Calella" in the original publication). At the beginning of 20th century Melichar (1906) described *Agalmatium curtulum* from Andalusia and *Tingissus guadarramense* from Sierra Guadarrama in Central Spain and Matsumura (1910) added *Agalmatium costale*, *Bergevinium malagense*, and *Fieberium pallidellum* from Malaga after his Mediterranean trip (originally all these species were described as *Hysteropterum*). In the second half of the twentieth century 2 further species were described: *Palmallorcus nevadensis* (originally as *Hysteropterum*) by Linnavuori (1957) from Almeria and Sierra Nevada in Andalusia and *Conosimus horvathi* (originally as *Sphenidius*) by Soós (1976) from Valencia. In 1980th Dlabola (1982, 1983, 1986, 1989) added 5 more species – *Clybeccus declivus* (originally as *Hysteropterum*), *Fieberium corsicum* (originally as *Agalmatium*), *Granum pooti* (originally as *Hysteropterum*), *Hysteropterum albaticum*, and *H. alicantium*. Gnezdilov (2002, 2003, 2005) revised the generic system of the European Issidae, erected 8 new genera and described 2 new species – *Iberanum dlabolai* and *Palmallorcus biemani*. Recently one more endemic species, *Conosimus baenai*, was added (Gnezdilov and Aguin-Pombo 2014). New records for Spain for *Conosimus coelatus*, *Hysteropterum dolichotum*, and *H. vasconicum* were published by Dlabola (1987), Gnezdilov et al. (2004), and Maryńska-Nadachowska et al. (2006). Thus until now 30 species from 14 genera have hitherto been recorded from continental Spain (Gnezdilov et al. 2014).

## MATERIAL AND METHODS

The taxonomy of the family Issidae follows Gnezdilov (2016) and morphological terminology – Bourgoin (1993), Gnezdilov (2002, 2003) and Gnezdilov et al. (2014). Male genital segments were macerated for 1 min in boiling 10% KOH solution. Drawings were made from dissected genitalia in glycerine jelly from the "Brunel Micro Ltd" using a Leica MZ95 light microscope with camera lucida attachment. Photos were taken using Leica Z16 APOA with

camera Leica DFC 490. Images were produced using the software Leica Application Suite V 4.5, Helicon Focus 6.7.1 and Adobe Photoshop CS5.

The type series of the species described below is divided between Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia (ZIN) and Dr. Ir. C.F.M. den Bieman Collection, Ulvenhout, The Netherlands (CBC).

## SYSTEMATICS

### Family Issidae Spinola, 1839

### Subfamily Issinae Spinola, 1839

### Tribe Issini Spinola, 1839

### Subtribe Issina Spinola, 1839

### Genus *Granadus* gen. nov.

**Type species:** *Granadus albirhombus* sp. nov., designated here.

**Etymology.** Generic name is derived from "Granada" – Province, municipality and city of Andalusia (Spain).

**Diagnosis.** Metope with only median carina distinct. Fore wings with wide hypocostal plate. Aedeagus with short ventral hooks arising in its basal third and covered by longitudinal lobes of the phallobase.

**Description.** Fore wings wide in dorsal view when connected (Figs 2, 5). Coryphe transverse, twice as wide as long medially; anterior margin slightly obtusely angulate; posterior margin concave. Metope longer than wide medially; lateral margin convex. Metope with distinct median carina running from its upper margin to metopoclypeal suture and with traces of sublateral carinae (Figs 4, 7, 8). Metopoclypeal suture sharply wedge-shaped, distinct only laterally (Fig. 8). Pedicel ball-shaped. Ocelli absent. Rostrum reaching hind coxae; third segment slightly shorter than second one, narrowing apically. Pronotum nearly as long as coryphe medially; anterior margin convex; posterior margin straight. Paradiscal fields of pronotum relatively wide behind the eyes. Paranotal lobes wide, nearly square, with lower margin unbend as a peak (Fig. 9, pnt). Fore wings with wide and long hypocostal plate (Fig. 9). Basal cell large, widely oval. Forewing veins sequence: R 2, furcating near to basal cell; M 3, first furcation in basal third of the wing, second furcation – before apex of clavus; CuA 1. Clavus long – 2/3 of wing length (Fig. 10). Transverse

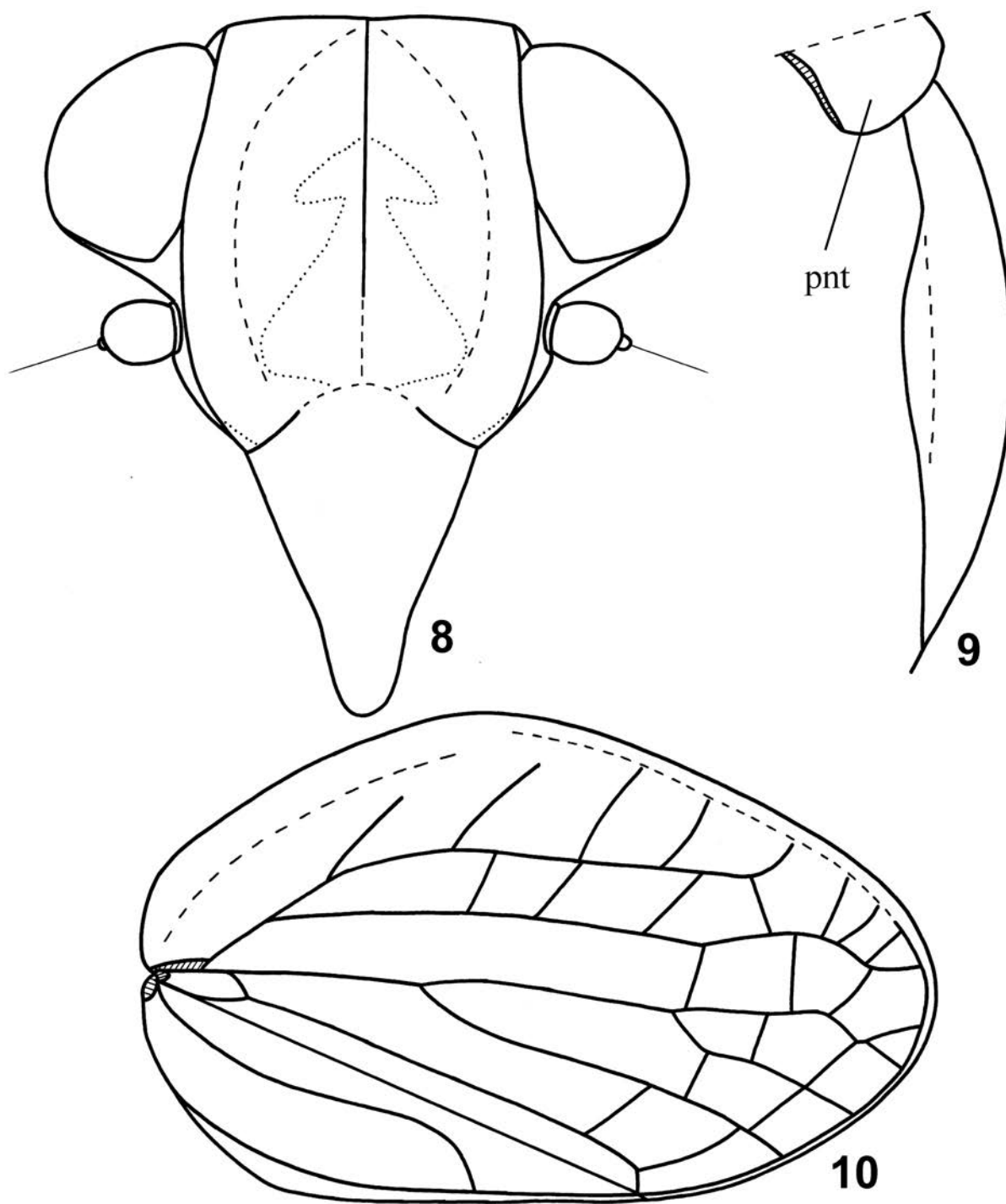


**Figs 2–7.** *Granadus albirhombus* gen. et sp. nov. 2 – male, paratype, dorsal view, 3 – same, lateral view, 4 – same, face, 5 – female, paratype, dorsal view, 6 – same, lateral view, 7 – same, face.

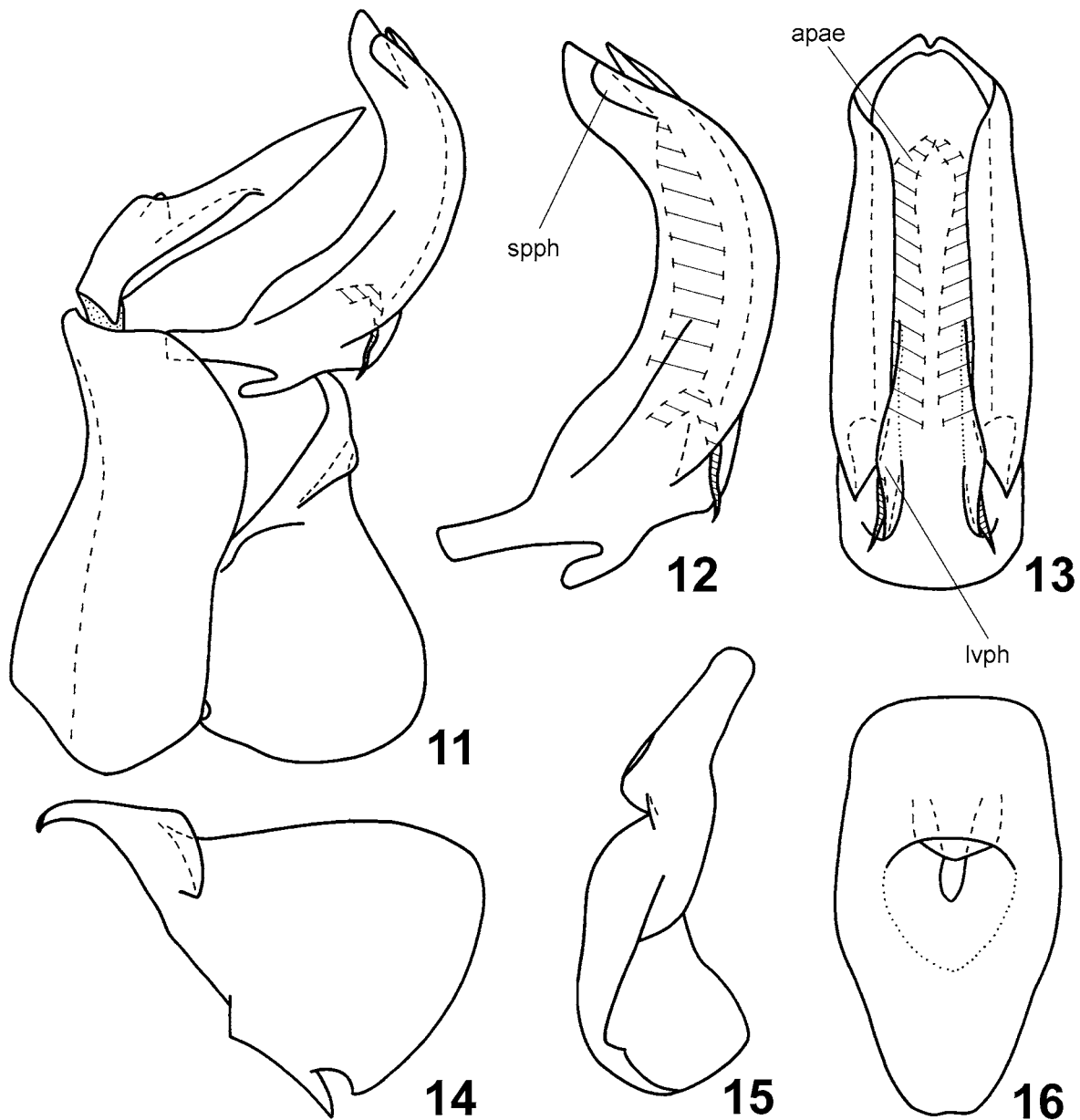
veins in small number. Hind wings rudimentary – in shape of wide ovals. Hind tibia with 2 lateral spines in its distal half and with 9–10 apical spines. First

and second metatarsomeres almost equal in length. First metatarsomere with 2 latero-apical spines and 9 intermediate spines in continuous row.





**Figs 8–10.** *Granadus albirhombus* gen. et sp. nov., male, paratype. 8 – head, frontal view, 9 – hypocostal plate of fore wing and paranotal lobe (pnt), 10 – fore wing.

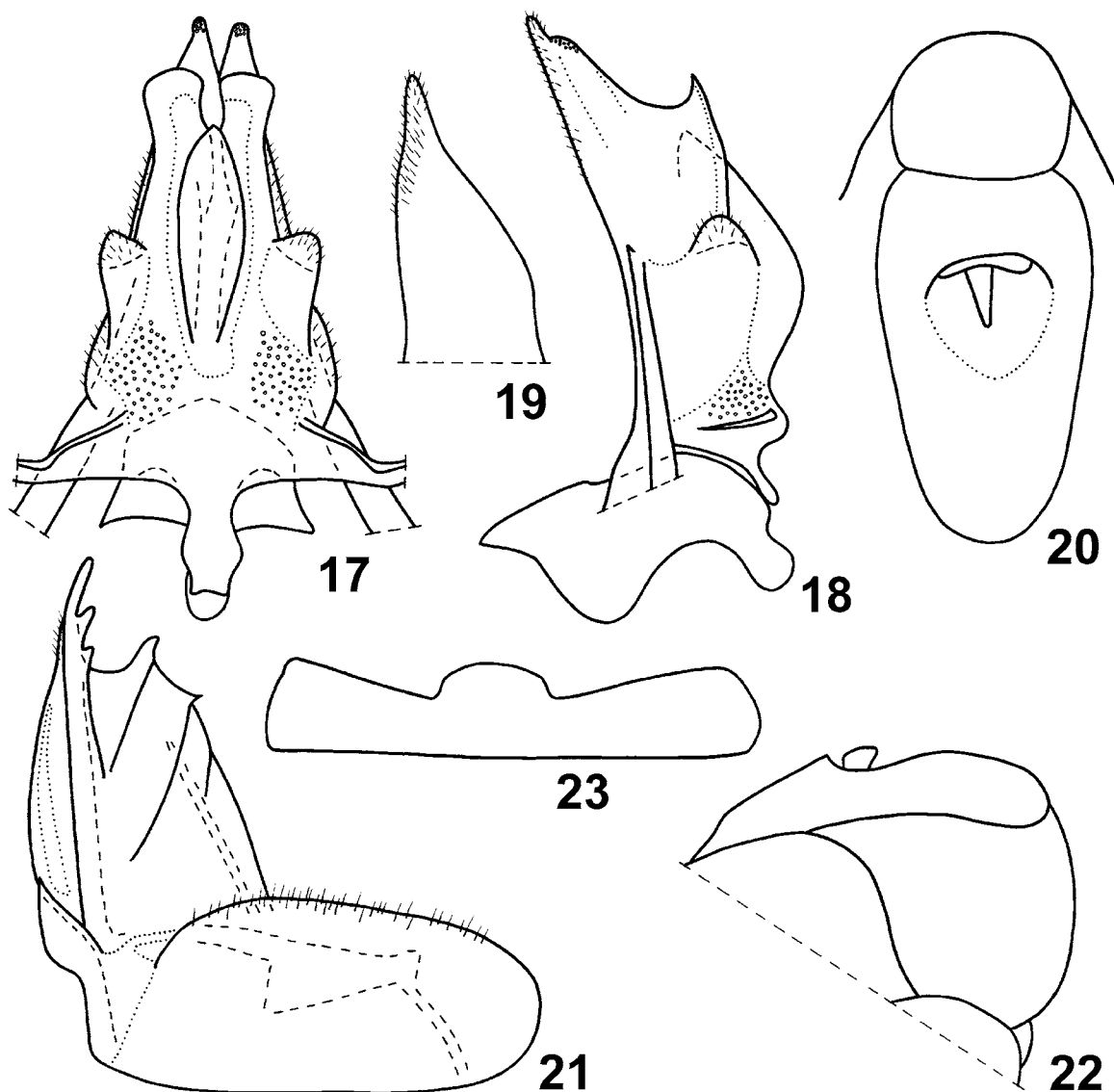


**Figs 11–16.** *Granadus albirhombus* gen. et sp. nov., holotype, male genitalia. 11 – genital block, lateral view, 12 – penis, lateral view, 13 – penis, ventral view, 14 – style, lateral view, 15 – style, dorsal view, 16 – anal tube, dorsal view. Abbreviations: spph – subapical process of phallobase, lvph – longitudinal lobe of ventral phallobase lobe, apae – apical processes of aedeagus.

Male genitalia. Phallobase slightly curved (in lateral view), narrow, dorso-lateral lobes fused dorsally (Figs 11–13). Each dorso-lateral lobe of the phallobase with semicircular subapical process (Fig. 12, spph). Ventral phallobase lobe long and wide, almost as long as dorso-lateral lobes, with two longitudinal lobes basally covering aedeagal hooks (Fig. 13, lvph).

Aedeagus with pair of short ventral hooks arising in its basal third (Fig. 12).

Female genitalia. Gonoplasts rounded, convex, without carinae (Fig. 22). Posterior connective laminae of gonapophyses IX elongate (in dorsal view) (Fig. 17). Lateral fields of the laminae lobe-shaped (Figs 17, 18). Median field of the laminae in shape



**Figs 17–23.** *Granadus albirhombus* gen. et sp. nov., paratype, female genitalia. 17 – posterior connective laminae of gonapophyses IX and gonospiculum bridge, dorsal view, 18 – same, lateral view, 19 – endogonocoxal process, 20 – anal tube, dorsal view, 21 – anterior connective lamina of gonapophyse VIII, lateral view, 22 – gonoplacs and anal tube, lateral view, 23 – sternite VII, ventral view.

of large single lobe. Gonocoxa VIII with lobe-shaped hind margin (Fig. 21). Anterior connective lamina of gonapophyse VIII with 3 rounded teeth in apical group and 2 teeth and 3 combs in lateral group.

***Granadus albirhombus* sp. nov.**  
(Figs 2–23)

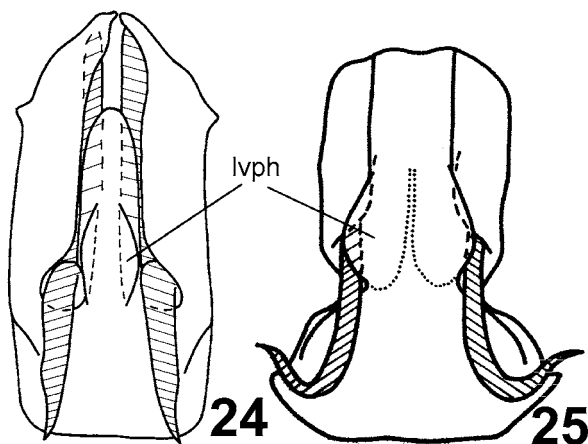
**Holotype**, Male, SPAIN, 6 km north of Castillo de Baños (municipality of Polopos, Granada Prov-

ince), 600 m, 19 May 2016, C.F.M. den Bieman leg. (ZIN).

**Paratypes**: 4 males (1 specimen in alcohol), 3 females, SPAIN, 6 km north of Castillo de Baños (municipality of Polopos, Granada Province), 600 m, 19 May 2016, C.F.M. den Bieman leg. (ZIN – 2 males, 1 female and CBC – 2 males, 2 females).

**Etymology**. The species named according to large light yellow or whitish rhomb-shaped area on metope.

**Type locality**. 6 km north of Castillo de Baños.



**Figs 24–25.** Issidae, male genitalia. 24 – *Celyphoma fruticulina* (Emeljanov, 1964), penis, ventral view (after Gnezdilov, 2016, modified), 25 – *Falcidius chlorizans* (Rey, 1891), penis, ventral view (after Gnezdilov and Wilson, 2008, modified). Abbreviation: lvph – longitudinal lobe of ventral phallobase lobe.

**Diagnosis.** Metope with densely distributed dark brown dots excluding large light yellow or whitish romb-shaped area besides of median carina in its lower half.

**Description.** External characters as mentioned for the genus.

Coloration (Figs 2–7). General coloration light brown yellowish, with dense dark brown dots on metope excluding light yellow or whitish median carina and large rhombus area besides of the carina in lower half of metope. Coryphe sometimes with dark brown to black lateral margins. Postclypeus light yellow or whitish frontally, with dark brown lateral stripes. Anteclypeus dark brown. Genae dark brown. Scapus and pedicel dark brown. Apices of rostrum, leg spines, and claws black. Pronotum with dark brown or black traces of sensory pits. Paranotal lobes with densely distributed dark brown dots fused in dark brown or black areas. Scutellum sometimes with brown dots. Fore wings with light yellow or whitish costal margin and hypocostal plate, sometimes with dark brown areas and spots and with dark brown dots in the cells; veins in some specimens dark brown. Femora with dark brown areas; hind femora in some specimens completely dark brown to black dorsally. Male and female anal tubes light yellow. Gonoplares dark brown to black, each with large nearly oval light yellow spot. Gonocoxa VIII dark brown to black, with light yellow hind margin.

Male genitalia (Figs 11–16). Anal tube elongate, narrowing apically, apex truncate (in dorsal view) (Fig. 16). Anal column (paraproct) short. Pygofer with convex hind margins in their upper halves (in lateral view) (Fig. 11). Fused dorso-lateral lobes of the phallobase with weak notch apically (Fig. 13). Ventral phallobase lobe narrowing apically, with weak apical notch (Fig. 13). Ventral hooks of aedeagus narrowing apically and directed downward (Fig. 12). Apical processes of aedeagus completely covered by the phallobase, curved subapically (Fig. 13, apae). Style massive, with straight hind margin and narrowly rounded caudo-dorsal angle (Fig. 14). Capitulum of style without neck (Fig. 14), narrow, not narrowing apically (in dorsal view) (Fig. 15), with wide lateral tooth.

Female genitalia (Figs 17–23). Hind margin of sternite VII with large rectangular median process (Fig. 23). Anal tube elongate, slightly narrowing to rounded apex, lateral margins turned down wringing out from above the gonoplares (Figs 20, 22). Anal column (paraproct) short. Gonoplares without notch between Gp1 and Gp 2; fork well sclerotized. Distal parts of posterior connective laminae of gonapophyses IX curved at right angle (Fig. 17). Endogonocoxal process narrowing apically (Fig. 19). Gonospiculum bridge large (Fig. 18).

**Total length** (from apex of coryphe to apices of fore wings). Males – 3.8–4.0 mm. Females – 4.8–5.0 mm.

## DISCUSSION

*Granadus albirhombus* gen. et sp. nov. is well distinguished within Issina by its peculiar male genitalia structure with short aedeagal hooks arising in its basal third and covered by the lobes of ventral phallobase lobe (Fig. 13). Similar lobes of ventral phallobase lobe are known for *Celyphoma fruticulina* (Emeljanov, 1964) (Fig. 24) and *Falcidius chlorizans* (Rey, 1891) (Fig. 25), however, these species (and genera) differ from *Granadus albirhombus* gen. et sp. nov. by other characters of the body and male genitalia (Gnezdilov 2003; Gnezdilov et al. 2014). Based on the single lobe of median field of posterior connective laminae of gonapophyses IX *Granadus* gen. nov. is similar to *Falcidius* Stål, 1866 and *Mulsanteureum* Gnezdilov, 2002. Thus formally until further phylogenetical analysis *Granadus* gen. nov. is going to Bubastia group of genera sensu Gnezdilov (2016).



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